

over Bissett as applied to claim 1 above, and further in view of U.S. Patent No. 5,657,704 to Schueler. These rejections are respectfully traversed.

Bissett teaches an apparatus and method for feeding coal into a coal gasifier. Central to the invention disclosed in Bissett is that a coal-water slurry is pumped to the desired pressure and then the coal is "dried" prior to feeding the coal into the gasifier by contacting the slurry with superheated steam in an entrained bed dryer for vaporizing the water in the slurry (Abstract).

With reference to, for example, col. 3, lines 53-56, the Office Action asserts that Bissett can reasonably be considered to teach some feature which is alleged to correspond to the recited feature of heating the mixture with a heater to convert at least a part of the water in the mixture into a form of steam; and feeding the whole mixture to a combustion furnace or gasification reactor. The analysis of the Office Action with respect to this feature fails for at least the reason that the entrained bed dryer (element 26 in Fig. 1) is neither a combustion furnace nor a gasification reactor, as positively recited in the pending claims.

Bissett discloses that the slurry mixture shown, for example, entering entrained bed dryer 26 via nozzle 36 is dried in the entrained bed dryer (see, e.g., col. 2, lines 52-58). Bissett goes on to state that "[t]he 'dried' coal and the steam are passed out of the chamber through an exit adjacent to the opposite end of the chamber into a separator where the coal is separated from the steam and then conveyed through a suitable conduit means into the coal gasifier" (col. 2, lines 59-64). There is no reasonable manner by which to construct the disclosure of Bissett as allegedly teaching any feature that can reasonably be considered to correspond to feeding the whole mixture to a combustion furnace or gasification reactor, wherein the whole mixture is transferred between an inlet of the heater and the combustion furnace or gasification reactor by a pump.

In Bissett, the "whole mixture" is never fed to the gasification reactor. The portion of Bissett that the Office Action relies upon as suggesting this feature specifically discusses the drying process occurring in the entrained bed dryer prior to any mixture being fed to a cyclone separator then to a gasifier. Attempting to construct the disclosure of Bissett to support the conclusions made by the Office Action in this regard is erroneous.

Additionally, it is not shown in any manner where specifically Bissett may suggest a discharge pressure at the pump is higher than an inner pressure in the combustion furnace or gasification reactor at least by 1.5 MPa and not higher than 22.12 MPa. This range is very specific and not, in any manner, suggested by the Bissett reference, nor is any specific portion of Bissett cited for allegedly disclosing such a range.

Further, the Office Action overly broadly construes what can reasonably be considered as being discoverable as optimum or workable ranges involving only routine skill in the art. The claims recite specific combinations of separate variables in specific ranges. There is no manner by which, without undue experimentation, one of ordinary skill in the art could have arrived at these combinations of features given the disclosures of Bissett and/or Buchanan.

The Office Action also overly broadly asserts, on page 4, what can reasonably be construed as an obvious matter of design choice. As discussed in great detail above, the structures of Bissett and the subject matter of the pending claims are so markedly different that making the modification asserted as a mere matter of design choice suggested by the Office Action is not supportable based on the varying structures. Modifying the Bissett reference as suggested would likely render the Bissett device unsuitable for its intended purpose, or impermissibly modify its principle of operation in which the slurry is introduced to the entrained bed chamber and not as a mixture directly to the gasification reactor.

As has previously been routinely argued, the analysis of the Office Action with regard to an inner diameter of the pipe in the heater becoming larger gradually along a direction of

flow is not taught by Bissett. Apparently, Applicant's arguments in this regard have now been accepted. It is understood that it is for this reason that the Office Action combines the Buchanan reference with the Bissett reference in an effort to render obvious at least this feature recited in the pending claims. This particular analysis of the Office Action fails for at least the following reason.

Buchanan teaches a vortex burner, in which air is fed at a tangential angle to cause a vortex so that fuel is mixed with air. The Office Action refers to element 26 of Buchanan as allegedly suggesting the features positively recited in the pending claims. This conclusion fails for at least the following reason.

Buchanan states "[t]he innermost refractory layer 24 includes an annular fillet or conical bottom portion 26 surrounding the air and fuel inlet opening 27 at the base of the combustion chamber" (col. 2, lines 48-51). Further, Buchanan states the action or effect of the conical bottom portion or angular fillet 26 as follows:

In particular, it should be noted that the angle of the spray cone of the fuel emitted from the end of the fuel tube 48 is substantially the same as the included angle between the angular fillet 26. Preferably, these angles of the fuel spray and the cone are kept within the range of 90° to 100°.

The provision of the conical bottom at this angle adds significantly to the combustion stability and shapes the fuel-air sprays and prolongs the swirling motion of the air entering the combustion chamber. In addition, the cone fillet 26 prevents an overly swirled air stream which may exit the air chamber from expanding into too big an angle which would result in poor fuel-air mixing. In other words, the provision of the fillet 26 presents an upper limit to the angle of divergence that the swirling air exiting the sleeve 38 may assume (col. 3, lines 44-59).

Thus, Bissett teaches that the conical bottom portion or angular fillet 26 is to provide combustion stability, to shape the fuel-air sprays, to prolong the swirling motion of air entering the combustion chamber and to prevent an overly swirled air stream. The Office Action mentions that this configuration of the angular fillet 26 in Buchanan may be

considered as being taught "for the purpose of regulating the expansion of the vortex so that vaporization is assisted." This conclusory statement is not supported by the disclosure of Buchanan in that (1) Buchanan does not suggest "regulating" the expansion of the vortex; and (2) to any extent that Buchanan may, regulation of the expansion of the vortex there is no suggestion that such regulation may assist in vaporization. Finally, even if the conclusory statement were taken as true, it is unclear how an objective of regulating the expansion of the vortex so that vaporization is assisted can reasonably be considered as, in any way, corresponding to any feature provided for the purpose that "the water in the mixture is gradually or stepwise converted into a form of steam," as is positively recited, among other features, in independent claim 1. Vortex regulation is not steam conversion, nor reasonably suggesting of steam conversion.

Lastly, because Buchanan relates to a burner structure itself, it is unclear, even given the combination of these disclosures, how one of ordinary skill in the art could reasonably be considered to have combined these references in the manner suggested with any degree of predictability or reasonable expectation of success. In fact, modifying the Bissett reference in the manner suggested by the Office Action with the addition of any structure from Buchanan would likely require such significant modification of Bissett to render the proposed combination improper.

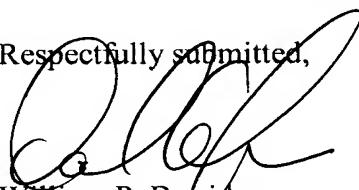
Based on the foregoing, Bissett and Buchanan are not combinable in the manner suggested by the Office Action, and any permissible combination of the applied references would not have suggested the combination of all of the features positively recited in independent claim 1. Further, claims 2-7, 9-18 and 21-24 also would not have been suggested by any permissible combination of the applied references for at least the respective dependence of these claims directly or indirectly on an allowable base claim, as well as for the separately patentable subject matter that each of these claims recites. Because Schueler is

not applied in the manner that would overcome the above-identified shortfall in the application of Bissett to the subject matter of independent claim 1, claim 20 would not have been suggested by any combination of Bissett and Schueler for at least the dependence of this claim on an allowable base claim, as well as for the separately patentable subject matter that this claim recites.

Accordingly, reconsideration and withdrawal of the rejections of claims 1-7, 9-18 and 20-24 under 35 U.S.C. §103(a) as being unpatentable over any permissible combination of the applied references, are respectfully requested.

In view of the foregoing, Applicant respectfully submits that this application is in condition for allowance. Favorable reconsideration and prompt allowance of claims 1-7, 9-18 and 20-24, in addition to the indicated allowable subject matter of claims 8 and 19, are respectfully requested.

Should the Examiner believe that anything further would be desirable in order to place this application in even better condition for allowance, the Examiner is invited to contact Applicant's undersigned representative at the telephone number set forth below.

Respectfully submitted,

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